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National Semiconductor

August 2000

Jameco Part Number 24096

LM384
5W Audio Power Amplifier

General Description

The LM384 is a power audio amplifier for consumer applications. In order to hold system cost to a minimum, gain is internally fixed at 34 dB. A unique input stage allows ground referenced input signals. The output automatically self-centers to one-half the supply voltage.

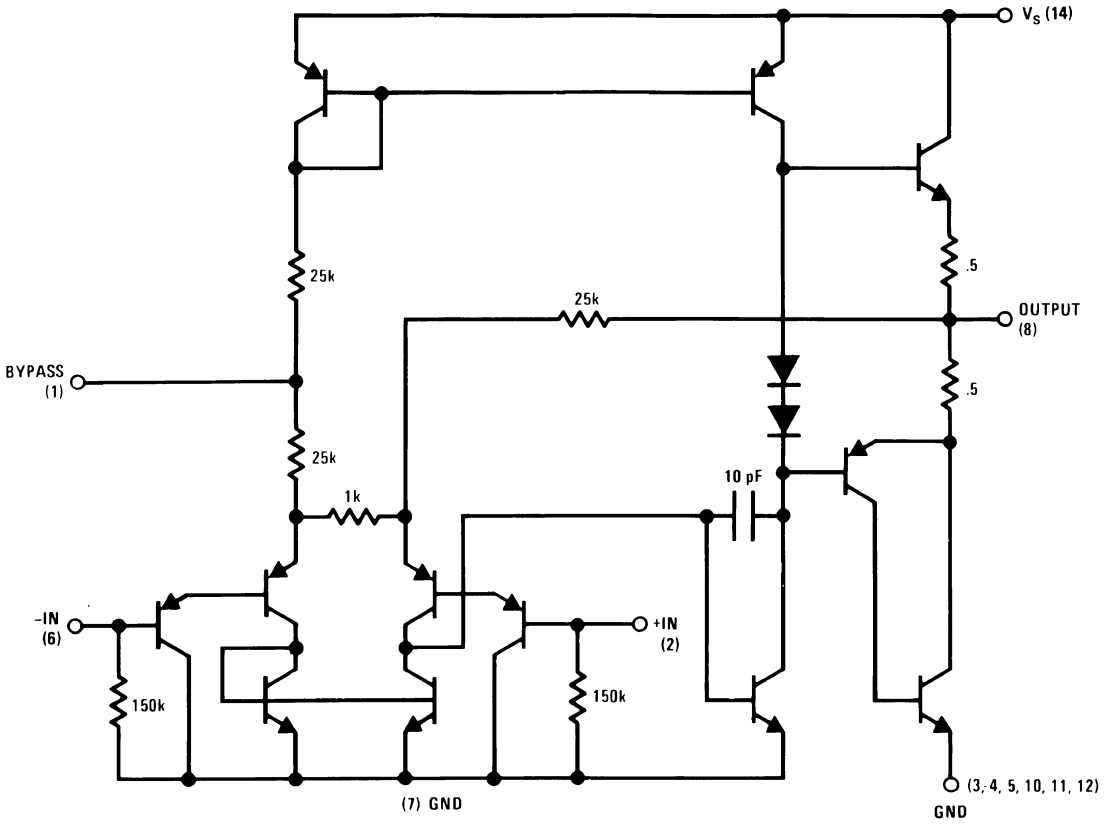
The output is short-circuit proof with internal thermal limiting. The package outline is standard dual-in-line. A copper lead frame is used with the center three pins on either side comprising a heat sink. This makes the device easy to use in standard p-c layout.

Uses include simple phonograph amplifiers, intercoms, line drivers, teaching machine outputs, alarms, ultrasonic drivers, TV sound systems, AM-FM radio, sound projector systems, etc. See AN-69 for circuit details.

Features

- Wide supply voltage range: 12V to 26V
- Low quiescent power drain
- Voltage gain fixed at 50
- High peak current capability: 1.3A
- Input referenced to GND
- High input impedance: 150kΩ
- Low distortion: 0.25% (P_O=4W, R_L=8Ω)
- Quiescent output voltage is at one half of the supply voltage
- Standard dual-in-line package

Schematic Diagram



DS007843-3

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Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage	28V
Peak Current	1.3A
Power Dissipation (See (Notes 4, 5))	1.67W
Input Voltage	±0.5V
Storage Temperature	−65˚C to +150˚C
Operating Temperature	0˚C to +70˚C
Lead Temperature (Soldering, 10 sec.)	260˚C
Thermal Resistance	
θ_{JC}	30˚C/W
θ_{JA}	79˚C/W

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

Electrical Characteristics (Note 2)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Z_{IN}	Input Resistance			150		kΩ
I_{BIAS}	Bias Current	Inputs Floating		100		nA
A_V	Gain		40	50	60	V/V
P_{OUT}	Output Power	THD = 10%, R_L = 8Ω	5	5.5		W
I_Q	Quiescent Supply Current			8.5	25	mA
$V_{OUT\ Q}$	Quiescent Output Voltage			11		V
BW	Bandwidth	P_{OUT} = 2W, R_L = 8Ω		450		kHz
V^+	Supply Voltage		12		26	V
I_{SC}	Short Circuit Current (Note 6)			1.3		A
$PSRR_{RTO}$	Power Supply Rejection Ratio (Note 3))			31		dB
THD	Total Harmonic Distortion	P_{OUT} = 4W, R_L = 8Ω		0.25	1.0	%

Note 2: V^+ = 22V and T_A = 25˚C operating with a Staver V7 heat sink for 30 seconds.

Note 3: Rejection ratio referred to the output with C_{BYPASS} = 5 µF, freq = 120 Hz.

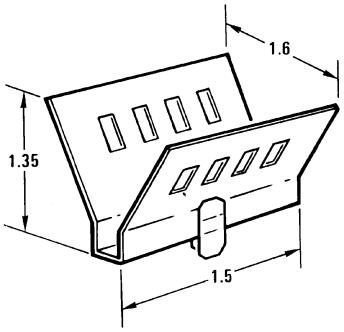
Note 4: The maximum junction temperature of the LM384 is 150˚C.

Note 5: The package is to be derated at 15˚C/W junction to heat sink pins.

Note 6: Output is fully protected against a shorted speaker condition at all voltages up to 22V.

Heat Sink Dimensions

Staver “V7” Heat Sink

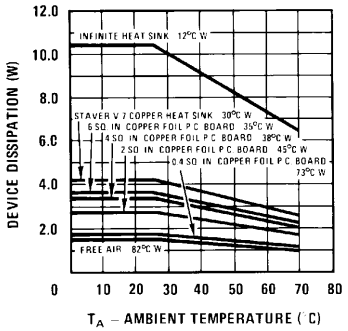


DS007843-4

Staver Company
41 Saxon Ave.
P.O. Drawer H
Bay Shore, N.Y.
Tel: (516) 666-8000

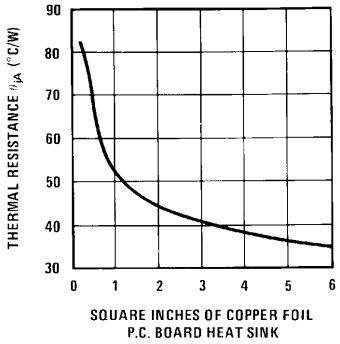
Typical Performance Characteristics

Device Dissipation vs Ambient Temperature


INFINITE HEAT SINK 12°C/W
STAVER V 7 COPPER HEAT SINK 30°C/W
6 SQ. IN. COPPER FOIL P.C. BOARD 35°C/W
4 SQ. IN. COPPER FOIL P.C. BOARD 38°C/W
2 SQ. IN. COPPER FOIL P.C. BOARD 45°C/W
0.4 SQ. IN. COPPER FOIL P.C. BOARD 73°C/W
FREE AIR 82°C/W
DEVICE DISSIPATION (W)
T_A – AMBIENT TEMPERATURE (°C)

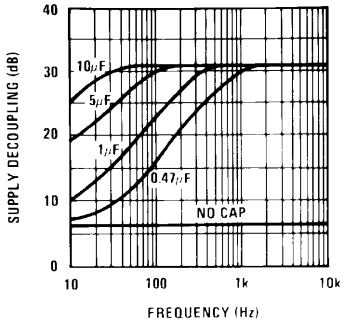
DS007843-10

Thermal Resistance vs Square Inches



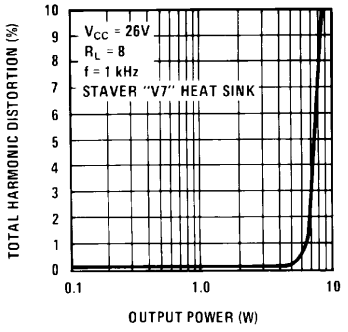
DS007843-11

Supply Decoupling vs Frequency



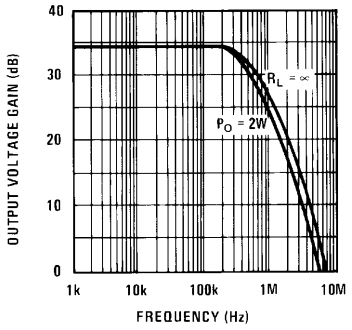
DS007843-12

Total Harmonic Distortion vs Output Power



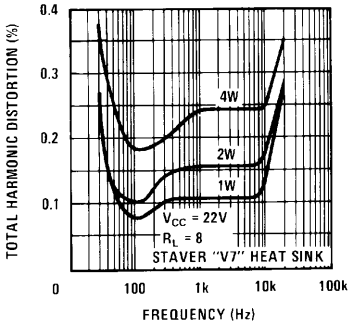
DS007843-13

Output Voltage Gain vs Frequency



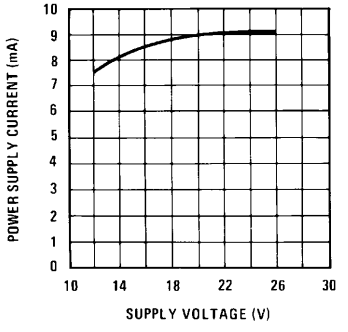
DS007843-14

Total Harmonic Distortion vs Frequency



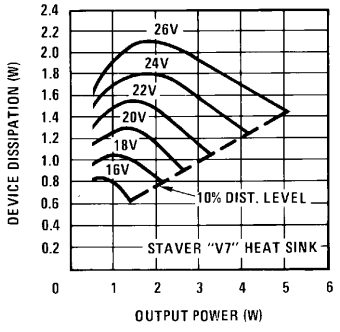
DS007843-15

Power Supply Current vs Supply Voltage



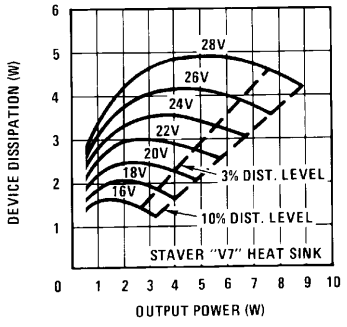
DS007843-16

Device Dissipation vs Output Power—16Ω Load



DS007843-17

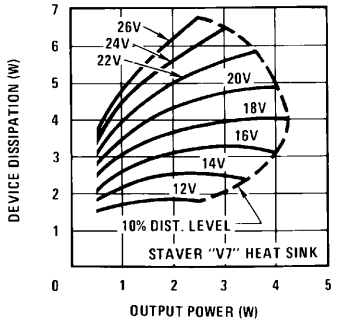
Device Dissipation vs Output Power—8Ω Load



DS007843-18

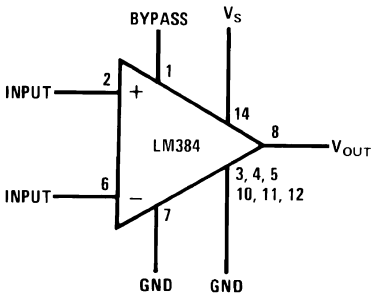
Typical Performance Characteristics (Continued)

Device Dissipation vs Output Power—4Ω Load



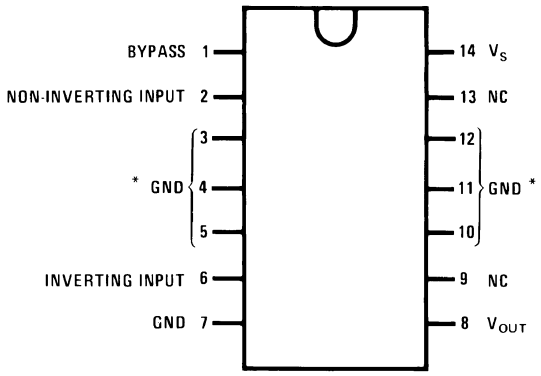
DS007843-19

Block and Connection Diagrams



DS007843-1

Dual-In-Line Package



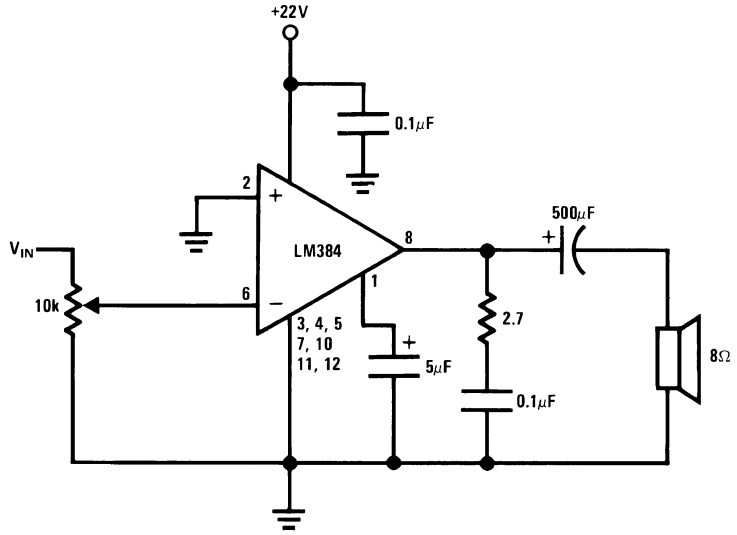
DS007843-2

Note 7: Heatsink Pins

Top View
Order Number LM384N
See NS Package Number N14A

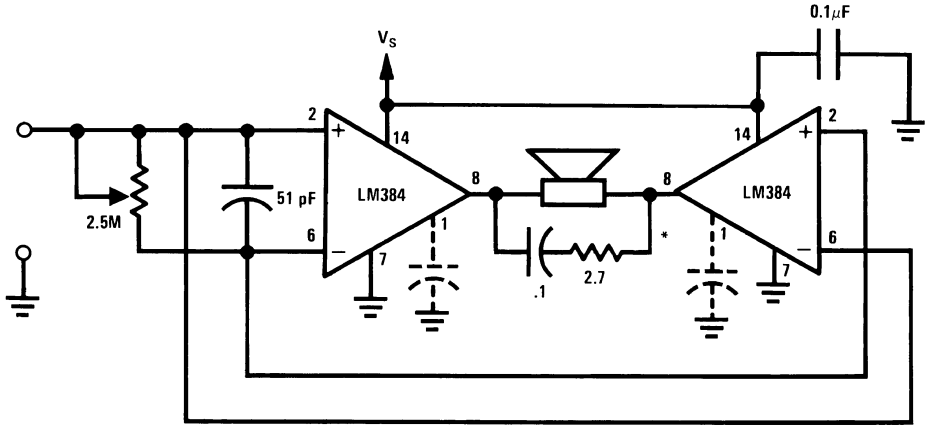
Typical Applications

Typical 5W Amplifier



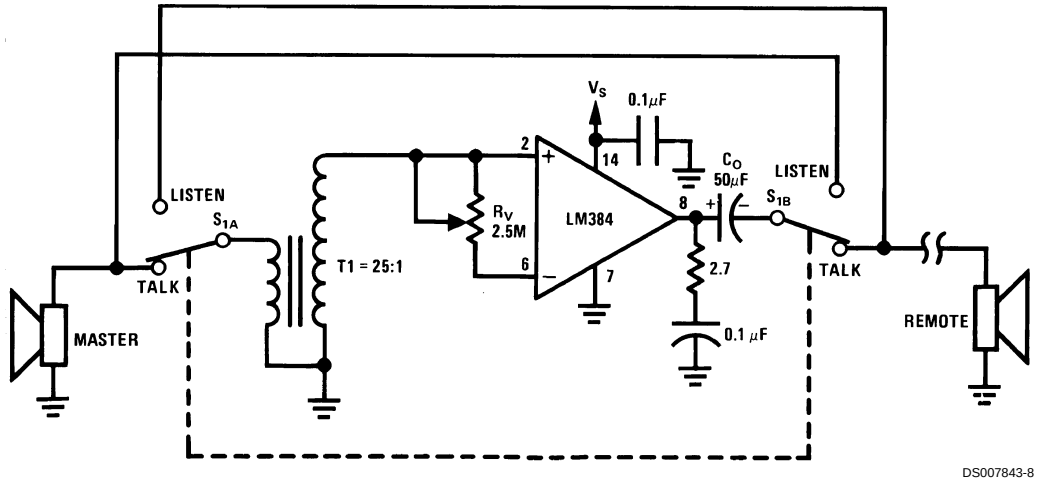
DS007843-6

Bridge Amplifier



DS007843-7

Intercom

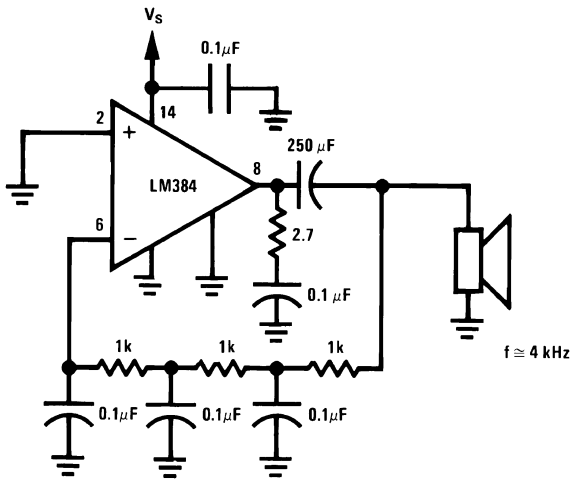


DS007843-8

*For stability with high current loads

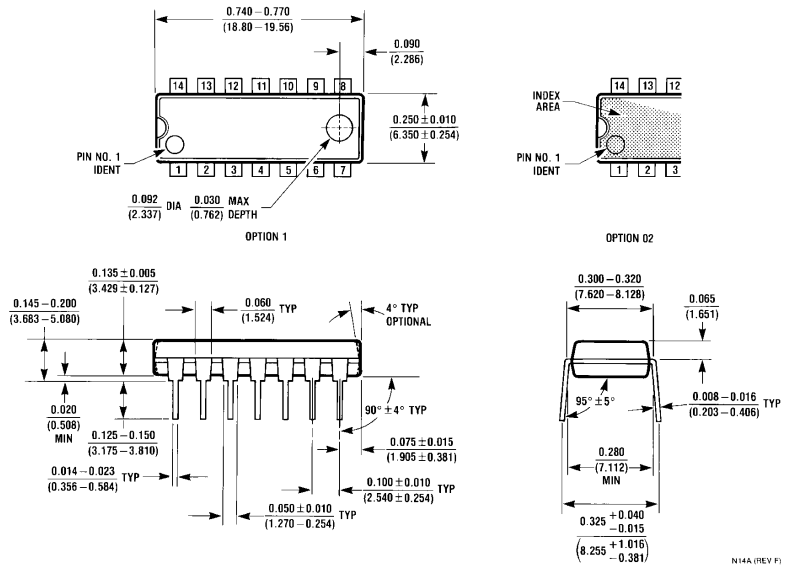
Typical Applications (Continued)

Phase Shift Oscillator



DS007843-9

Physical Dimensions inches (millimeters) unless otherwise noted



Molded Dual-In-Line Package (N)
Order Number LM384N
NS Package Number N14A

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